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As Donelson's retirement draws near Science Academy's awards pile up

By MARLA K. KUHLMAN

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Gahanna Lincoln High School Science Academy coordinator Fred Donelson said he wanted to inspire students to become passionate about science and help them receive recognition for their efforts when he received permission to begin the new STEM program eight years ago.

"I thought we had a good plan to help kids get into the cutting edge of science and research, but the results have even surprised me," said Donelson, who is retiring at the end of this school year. "We have developed a group of science and engineering students who are passionate about science, are able to design, implement, test and troubleshoot unique ideas, prototypes and solutions to everyday problems and are able to communicate these ideas in both writing and presentation."

Over the past six years, Donelson's students have received scores of awards at state, national and international science competitions and have received major scholarships at outstanding engineering programs like Ohio State University, Case Western Reserve University, Carnegie Mellon University, Purdue University and Caltech.

His alumni are working at major institutions, including in the Underwater Division of Battelle and NASA (see related story).

The Gahanna underwater robotics team has been a regular contender in the MATE International Remotely Operated Vehicle competition, defeating high schools and universities from all over the world.

Most recently, Gahanna Science Academy students won 11 percent of the awards at the Believe in Ohio state final competition in Westerville late last month. Students Sarah Ryan, Aaron Glanville, Sibi Sengottuvel, Grant Benninger, Diego Quevedo and Daniel O'Grady won major scholarships and cash awards totaling \$92,500.

Believe in Ohio is a student STEM entrepreneurship program of the Ohio Academy of Science, in cooperation with Entrepreneurial Engagement Ohio, and funded by the Ohio General Assembly through the Ohio Board of Regents.

"Believe in Ohio is the only statewide Ohio student STEM education program to integrate entrepreneurship and innovation as pathways to create future jobs," said Dr. Lynn Elfner, co-director of Believe in Ohio.

"As I read their plans, I had to remind myself that these were high school students, not college or graduate students," said Bob Sopko, director of the Blackstone Launchpad Entrepreneurship program at Case Western. "Their presentations were tremendous and strong."

Gahanna's Quevedo, a senior, and Glanville, a junior, began this year by presenting their projects at Underwater Intervention 2015 in New Orleans.

The trip, sponsored by a local donor, included plane tickets and accommodations. Quevedo developed an inexpensive remote aquatic sensor device that monitors various indicators of water quality and sends them via radio signals in real time to onshore computers.

Glanville has created and tested a prototype device that could be placed on an remotely operated vehicle and is used to penetrate hulls and then remotely pump oil out of sunken ships.

With thousands of World War II ships decaying rapidly throughout the world and hundreds of tank ruptures expected in the next 10 years, his research is on the cutting edge of environmental protection, Donelson said. He said leading businesses already have expressed interest in both of the projects and offered help and assistance to those two students.

Eight Science Academy students also made presentations at the Regional Ohio Junior Science and Humanities Symposium at Bowling Green State University in



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Aaron Glanville (left), Diego Quevedo and Science Academy teacher Fred Donelson pose for a photo after presenting at the 2015 Underwater Intervention trade show in New Orleans in February.

Ryan received a second-place poster award for her work on soft robotics based on prehensile tails of New World monkeys, a relatively new field in gripper development for robotics. She not only worked on the actual prototype, but she also designed circuitry, 3-D modeled and then printed parts, programmed her device and tested it for structural integrity.

Ethan Polster was the big winner at the symposium, placing third overall (\$1,000) and qualifying to present at the National Junior Science and Humanities Symposium in Maryland.

His work using starlight curves from the Kepler space observatory has provided evidence that Salpeter's law on initial mass function in star formation -- a theory that has stood for about 75 years -- is wrong and needs to be recalculated based on new evidence.

Donelson said Polster is the first person to look at B stars with this particular method and truly is on the cutting edge of astronomical research.

Donelson also has been instrumental in helping his students have international experiences. For the past two years, he has taken Science Academy students to China to help teach Chinese high school students in Beijing and Hefei about underwater robotics by having his students help the Chinese build working mini remotely operated vehicles. His students also have sponsored camps for visiting Chinese students to learn about and build ROVs.

This year's Science Academy students also completed another year of outstanding results in the Columbus Technical Council Science Paper 2015 competition.

Quevedo received the top award (\$100) from the Instrument Society of America. Benninger and Glanville both received honorable mentions for their discussion of ethical issues involved in their research.

Benninger also received the Institute of Electrical and Electronic Engineers award (\$150). Ryan, a senior, won the top award (\$100) from the American Society of Materials and was named CTC Outstanding Science Student of the Year for 2015 (\$500).

The papers for those awards are highly technical papers, averaging 40-60 pages, and rival many master's theses in quality, according to Donelson.

He and team English teacher Becky Rice said they were excited about the results.

"It's so great to see the hard work of these students pay off," Rice said. "Most of these students had no idea what a scientific abstract or an APA style paper was a year ago, and now they are being rewarded as some of the best high school papers in all of Ohio."

Donelson agreed.

"For the kids to do so well our last year out was extra special for me," he said. "It is exciting to see something that used to be my dream actually come to fruition."

Donelson has taught for 39 years -- 31 at Gahanna Lincoln.

"I'm still going to mentor some independent projects and work with the underwater-robotics team at GLHS," he said. "I'm excited that my colleague, Tyler Bruns, is taking over for me. He has helped me the last three years with underwater robotics, and he has demonstrated the same love and passion for kids and science that I have. I feel good that the program is in good hands, and I don't think it will miss a beat."

In his retirement, Donelson said, he plans to teach two months in China -- one month in the fall and one in the spring.

"I will be teaching Chinese science teachers how to do STEM hands-on classes, something that they don't regularly do," he said. "I will be using underwater robotics as my curriculum, so I still will get to teach some of my favorite stuff."

He also plans to launch a motivational-speaking company.

"Becoming a teacher was one of the best decisions I have ever made, and I will miss it," Donelson said. "Hopefully, I can inspire more great folks to enter teaching."

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